Maryland Energy ADMINISTRATION

Powering Maryland's Future

Policy 2:

Reduce conventional centralized electricity generation serving a local government's buildings by meeting 20% of those buildings' electricity demand with distributed, renewable energy generation by 2022.

INTRODUCTION

Maryland's Renewable Portfolio Standard (RPS) requires that 20 percent of Maryland's electricity sales come from renewable energy sources by 2022, including 2 percent from solar energy. The eligible technologies include, but are not limited to solar, wind, geothermal heating & cooling, waste-to-energy, poultry litter to energy, ocean energy, and qualifying biomass.

GOAL

Becoming a Maryland Smart Energy Community requires that a local government (city, town or county) adopt a policy to utilize distributed, renewable sources to generate or displace at least 20% of its electric energy by 2022. This goal applies to buildings owned by the county/local government.

DELIVERABLES

By applying to become a Maryland Smart Energy Community, the local government agrees to the following three deliverables, to be completed by December 31, 2013:

(1) Develop an initial estimate of total local government building electricity consumption for a baseline year. This baseline electricity consumption must include all divisions and departments of the local government including all municipal buildings, drinking water and wastewater treatment plants, and pumping stations owned by the local government. If you are also pursuing Policy 1, please use the same electricity consumption baseline.

- The baseline year should consist of the most recent year of complete data. For applications in the spring of 2013, this should be 2012. However, if you are using an earlier year for the baseline pursuant to Policy 1, please use that same year for Policy 2.

- The electricity use baseline should be provided on a MWh (megawatt-hour) or kWh (kilowatt-hour) basis. Please be sure to specify your units. 1000 kWh = 1 MWh. Gross floor area should also be provided to determine an electricity use per square foot calculation. Measuring electricity use per square foot allows for new buildings to come online that will contribute positively to the per square foot reduction goal.

- MEA recommends entering building data into ENERGY STAR Portfolio Manager to establish the electricity baseline inventory. A variety of tools and methods are acceptable, but must be approved by MEA. If a local government owns a very large number of buildings, they may work directly with MEA to define an appropriate way to benchmark and plan for electricity reductions on the most relevant subset of their buildings.

- If you choose to use Portfolio Manager, completing the baseline inventory requires the following information about each building:
  -Building street address
  -Year built
  -Gross floor area
  -Key operating characteristics for each major space type (details found on the Portfolio Manager website)
  -12 consecutive months of electricity bills. If you don't have this information readily available, contact your electric utility provider, as most will be able to easily supply this historical information.

For all buildings:

- Using the separately-provided Excel spreadsheet called "Energy Use Baseline," provide the annual MWh consumption. Include building size (gross square feet) and a calculation of electricity consumption intensity (MWh/SF). The Excel spreadsheet can be found at http://energy.maryland.gov/Govt/SmartEnergyCommunities

or

- Use ENERGY STAR Portfolio Manager to provide a summary of baseline energy consumption, in MWh. Include building size (gross square feet) and a calculation of electricity consumption intensity (MWh/SF)

(2) Pass a policy committing the local government to utilize distributed, renewable sources to generate or displace at least 20% of its electric energy by 2022.
MEA will provide sample policy language that local governments can modify to suit their specific needs. MEA will provide local governments with technical support as they work through the policy development process.

(3) Develop and initiate a *Renewable Energy Action Plan* (REAP) to map out how the community will reach its Renewable Energy Goal.
A local government will need to assess its existing renewable energy generation percentage to estimate the additional renewable energy needed to meet a 20 percent goal. To do so, the community should determine the amount of renewable energy generation installed at their county or local government buildings at a specific, recent point in time. This will be converted to an equivalent annual renewable energy generation in MWh, which can then be divided by the annual energy consumption to calculate its existing renewable energy generation percentage.[1]

A community's Renewable Energy Goal can then be set by subtracting its current renewable energy generation percentage from the 20% Maryland Smart Energy Community goal. For example, if a community was already meeting 3% of its energy consumption needs with renewable energy, it would subtract 3% from 20% to get a17% Renewable Energy Goal.

To develop and initiate a comprehensive REAP, local governments will need to assess its available renewable energy resources, identify the resource conversion technologies that it wants to deploy, the building sites where it would site the technologies, and the amount of energy that would be generated from those technologies to meet its Renewable Energy Goal. For detailed instructions on how to develop a REAP, please see INSTRUCTIONS FOR CREATING A RENEWABLE ENERGY ACTION PLAN section at the end of this document.

[1] Ideally, the local government can leverage existing funding to implement this baseline study of installed renewable energy generation; if the local government does not have funding available for this purpose, it can use a portion of the Smart Energy Communities grant administration allocation to do so, as approved by MEA.

ANNUAL REPORTING

The local government will submit annual reports to MEA documenting the progress made during that year. Participants must show that they are making a good-faith effort to achieve the renewable energy resource goal. Local governments who earn the Smart Energy Community designation and are up-to-date on their annual reporting may be eligible for grant funding in future years.

PROGRAM SUPPORT

The Maryland Energy Administration will provide technical assistance to all participating local governments to help with (1) developing an initial estimate of total local government building electricity consumption for a baseline year, (2) developing and passing the proper policies/ordinances to utilize distributed, renewable sources to generate or displace at least 20% of its electric energy by 2022, and (3) developing a Renewable Energy Action Plan. Participants may use 20%, or up to $30,000, of their grant award to pay for the administrative costs related to passing this and/or the other required policies.

FOR MORE INFORMATION

MEA and the University of Maryland Environmental Finance Center are available to provide further information and technical assistance to communities, as requested.

Website: http://energy.maryland.gov/Govt/smartenergycommunities/

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INSTRUCTIONS FOR CREATING A RENEWABLE ENERGY ACTION PLAN

RENEWABLE ENERGY ACTION PLAN (REAP) OUTLINE

I. LETTERS FROM THE LOCAL GOVERNMENT VERIFYING ADOPTION OF THE REAP

- The LOCAL government must provide a letter from the Chief Executive Officer of the city or town stating that it has adopted the REAP. The Chief Executive Officer is defined as the city/town manager, the Mayor, the County Executive, the County Commissioners, or equivalent.
- Include a copy of the enabling legislation or policy.

II. EXECUTIVE SUMMARY

A. ***Narrative Summary of the Town*** - including population, Energy Star© ratings for the energy consumption baseline, an assessment of renewable energy resources, renewable energy resource conversion technologies, renewable energy generation projects and output potential, renewable energy project financing, etc.

B. ***Summary of Municipal Energy Uses*** - use instructions below to create Table 1 (sample below). Reiterating the Table 1 contents in text is not required.

- *Total Number of Local Government Buildings* - broken down by type of heating fuel (e.g. electric, oil, propane, natural gas, etc.). This program focuses on reducing electricity consumption, but there may be opportunities in the future to reduce other fuel types as well.
- *Water and Sewer* – note the number of drinking and wastewater treatment plants and pumping stations owned by the local government.

Table 1: Summary of Municipal Energy Users (Sample Data)

	Number
Buildings	
Electric Heat	8
Oil Heat	5
Natural Gas Heat	0
Propane Heat	4
Biomass Heat	0
Other Heat Type	0
Buildings Planned for Addition in Next 5 Years	1
Buildings the City Plans to Relinquish in Next 5 Years	0
Water and Sewer	
Drinking Water Treatment Plant	1
Wastewater Treatment Plant	0
Pumping Stations	10

C. ***Summary Renewable Energy Goal Determination*** – use sample Table 2 provided below.

Table 2: Renewable Energy Goal Determination

	Existing Renewable Energy Generation as a Percentage of Existing Electricity Load	Cumulative MD Smart Energy Goal, by 2022	Renewable Energy Goal
Buildings	*E.g., 3%*	*E.g., 13%*	*E.g., 10%*
Water/Sewer/Pumping	*E.g., 1%*	*E.g., 5%*	*E.g., 4%*
Open Space	*E.g., 0%*	*E.g., 2%*	*E.g., 2%*
Total	***E.g., 4%***	***20%***	***E.g., 16%***

III. ENERGY USE BASELINE INVENTORY

Note: If also pursuing Policy 1, this section can be the same for both plans.

A. *Identification of the Baseline Year*

B. *Local Government Energy Consumption for the Baseline Year*

How much electricity did your local government buildings use in the baseline year? MEA recommends using ENERGY STAR Portfolio Manager to create a baseline inventory and track the ongoing energy consumption. If you choose not to use Portfolio Manager, provide a description of how you determined the baseline, as well as all relevant data and calculations.

For all buildings:

- Using the separately-provided Excel spreadsheet called "Energy Use Baseline," provide the annual MWh consumption. Include building size (gross square feet) and a calculation of electricity consumption intensity (MWh/SF). The Excel spreadsheet can be found at http://energy.maryland.gov/Govt/SmartEnergyCommunities

  Or

- Use ENERGY STAR Portfolio Manager to provide a summary of baseline energy consumption, in MWh. Include building size (gross square feet) and a calculation of electricity consumption intensity (MWh/SF)

IV. RENEWABLE ENERGY ACTION PLAN

A. ***Narrative Summary –***

1. *Identify Areas of Greatest Renewable Energy Generation Potential.* This can be determined by assessing renewable energy resource availability, sites, area, technologies that can convert renewable resources to electricity or thermal energy, actual projects, and potential generation outputs of those projects.

B. ***Getting to a 20% Renewable Electricity Generation by 2022*** **-** The local government will need to develop a Renewable Energy Action Plan, showing how the local government plans to utilize distributed, renewable sources to generate or displace at least 20% of its electric energy by 2022. This section should include electricity generation anticipated from all divisions and departments including: all local government buildings, drinking water and wastewater treatment plants, and pumping stations owned by the local government.

1. *Program Management Plan for Implementation, Monitoring and Oversight* – Identify the personnel responsible both for oversight of the REAP implementation and for implementation of renewable energy generation projects in specific departments or buildings, if applicable. Also identify personnel responsible for the Annual Reporting requirements.

2. *Renewable Energy Resource Assessment.* The cost effectiveness of renewable energy options depend primarily on 1) the cost of the conventional energy solution, 2) the cost of the renewable energy conversion technology itself, and 3) the quality of the renewable energy resource. Assessing the quality of energy resources is termed "resource assessment." As a first step, the local government will need to assess the amount of renewable energy resources available to be used in its buildings, sites where the renewable energy conversion technologies would be sited, and the amount of area available for the technologies. The government can fill in the table below as a guide:

Renewable Energy Resource	**Resource Availability**	**Sites (Building rooftops, open space, etc.)**	**Area (Sq. Ft.) Available for Renewable Energy Conversion Technologies**
Solar	*E.g., average of 5.3 kW hours/day/square meter*	*E.g., 6 county buildings with flat roofs, 1 open recreation area*	*E.g., 600,000 sq. ft. of flat roof space that could support ballasted roof-mount PV arrays, 2 acres of open recreation area that could host a ground-mount PV array*
Wind	*Can be determined with anemometer*	*E.g., community-owned land next to landfill*	*E.g., 4 acres that could host wind turbines and meet local ordinance restriction*
Geothermal heating & cooling	*Nearly inexhaustible supply of stored thermal energy*	*Can drill wells next to 6 county buildings*	*Sufficient space for large drill rigs to drill multiple deep wells*
Poultry litter waste to energy	*May need engineering study*	*TBD*	*TBD*
Ocean energy	*May need engineering study*	*TBD*	*TBD*
Qualifying biomass	*May need engineering study*	*TBD*	*TBD*

MEA will assist local governments in assessing their renewable energy resource availability, as needed, by sharing a variety of Maryland-specific studies and data. Some renewable energy resource availabilities may need to be determined by professional engineering studies.

3. *Renewable Energy Resource Conversion Technologies*. Next, the local government should identify the most appropriate renewable energy resource conversion technologies to meet the Renewable Energy Goal. Some basic information on some of Maryland's more commonly used technologies follows:
    a. *Solar photovoltaics (PV)* use sunlight to generate electricity. A PV panel is made up of many individual solar cells, all of which are covered with a protective sheet of glass in a PV module or panel. The cells are made from silicon, a very common chemical element found in sand. PV is a popular solar energy resource conversion technology that can take advantage of Maryland's plentiful solar resources.
    b. *Solar water heating (SWH)* systems use flat plate, evacuated tube of glazed polymeric collectors that collect and concentrate the sun's heat and transfer the heat to homes and businesses using a heat transfer fluid. Large-scale SWH systems are best suited for use in buildings that have a high demand for hot water, such as multi-family housing development and detention centers.
    c. *Geothermal Heating & Cooling (GHC)* systems heat pump systems use the constant temperature of the earth to heat and cool homes and buildings by exchanging heat with the earth:
        i. In the winter, they move the heat from the earth into the house or building.
        ii. In the summer, they pull the heat from the house or building and "dump" it into the ground.
        iii. Provide hot water, year-round, with a "desuperheater."
    d. *Wind power* is one of the most efficient, deployable, scalable and affordable renewable energy technologies. Under Maryland's net metering statute, customers can receive credit for generated energy from utilities even when it exceeds their demand.

3. *Renewable Energy Generation Projects and Output Potential* -- List planned renewable energy generation projects, including the annual renewable energy generation potential (kWh/yr) for each project, as illustrated in the table below for a hypothetical Project #1:

Project #1

Renewable Energy Resource	**Conversion Technology**	**Capacity** (amount of generation potential, in units of output)	**Capacity Factor** (annual actual output/annual theoretical output, measured in hrs/yr)	**Projected Annual Renewable Energy Output Potential** (a product of capacity x capacity factor, in kWh/yr)
E.g, Solar	*E.g., PV*	*E.g., 120 kW*	*E.g., 14% or 1,227 hrs/yr*	*E.g., 147,240 kWh/yr*

For each project, also provide its projected timeline.

4. *Renewable Energy Project Financing* -- The local government should specify the means by which it is going to finance renewable energy projects, including direct purchase using existing funds, loans from financial institutions, or one of several no- or low-cost financing options.

An example may illustrate the how solar PV, using a no-upfront-cost Power Purchase Agreement (PPA)--a contract by which a third-party developer which owns, operates, and maintains the PV system, and a host customer which agrees to site the system on its roof or elsewhere on its property and buys the PV system's electricity (rather than the PV system itself) from the developer for an agreed-upon period of time--could be implemented to meet a community's full 20% Renewable Energy Goal. In this scenario, let's presume a Maryland Suburban County had an estimated annual energy consumption of 37,200,000 kWh, as calculated in the table below.

Annual community energy consumption

Community scenario	Monthly community energy consumption (kWh)	Annual community energy consumption (kWh)	20% of annual energy consumption to be met with renewable energy (kWh/year)
Suburban county	*3,100,000*	*37,200,000*	***7,440,000***

The Suburban County could then work with solar PV developers to contract for electricity from PV systems through a PPA, with no upfront capital expenditures. This financial arrangement allows the host customer to receive stable electricity, and ideally at a lower-cost than conventional electricity, while the developer can benefit from valuable financial benefits such as the Federal Investment Tax Credit, advanced depreciation of the PV system, income generated from the sale of electricity to the host customer, and the Solar Renewable Energy Certificates (SRECs) associated with the amount of electricity generated. Ideally, the building owner or operator can buy PV-generated electricity through the PPA at rates lower than those from conventional electricity providers, creating immediate positive cash flows from energy savings.

In this scenario, the Suburban County would need a 6,060 kW solar PV system that generates **7,435,620** kWh/year. Let's assume the County negotiated with the PV developer to buy solar electricity at $0.10/kWh, at a total annual cost of $743,560, as illustrated in the table below. This is not an additional expense – instead, it replaces what the County is currently paying for electricity. If this price for electricity is below what the County would otherwise be paying for conventional electricity, it could create **immediate positive cash flow from energy savings.**

Community scenario	Solar PV capacity (kW)	14% capacity factor (hrs/year)	Annual output (kWh)	PPA rate	Annual electricity cost
Suburban County	*6,060*	*1,227*	*7,435,620*	*$0.10/kWh*	*$743,560*

The example above is one option for meeting the policy. There are a variety of other zero-to-low upfront capital outlay options available to communities, such as:

- Leasing geothermal heating & cooling systems from companies which finance, install, operate, and maintain these clean HVAC systems and sell the heating, cooling, and hot water services over an agreed-upon period of time.
- Contracting with solar water heating developers to buy hot water at a rate 30 percent lower than it could get the hot water from conventional means, a service currently being offered by at least one provider.
- Contracting with an Energy Services Company (ESCO) which could finance, install, and maintain a renewable energy system and share the energy and cost savings with the building owner.

- Issuing low-interest bonds to finance large-scale renewable energy systems, e.g. community-scale wind systems on public lands.
- Facilitating "shared solar" installations will allow consumers without direct access to renewable energy resources (e.g. without enough sunshine to power a PV system) to buy a percentage of a local solar PV system.

For each project, also provide:

- the projected total cost
- any Federal, State, local, and utility incentives received
- any planned use of Maryland Smart Energy Communities grant funds, if designated

C. ***Questions about Institutionalizing Renewable Energy Generation Goals – Beyond 2022***

1. Has the local government considered a renewable energy generation revolving loan fund (in which some of the energy savings are reinvested into a revolving fund to finance future renewable energy projects)?
2. Would the local government be interested in incorporating renewable energy generation into its Emergency Preparedness and Recovery plans?
3. Would the local government be interested in streamlining procurement and permitting processes necessary for renewable energy?
4. Would the local government be interested in learning more about "net zero energy building" codes and standards?
5. What enabling policies would help the local government meet its renewable energy goals?

V. LIST OF RESOURCES

Identify resources that the local government used to create its REAP (websites, documents, tools).